

REMARKS

Introduction

Claims 1-3 and 6-22 are pending, of which claim 1 and 16 are independent.

Claims 1-3 and 16-18 have been amended to correct informalities in the claim language and to more clearly define the claimed subject matter. Claims 21 and 22 have been added. Support for the amendments and for the new claims is found, for example, at original claims 2 and 17, paragraphs [0046] and [0051] of the specification. No new matter has been entered.

Applicants note with appreciation that the Examiner conducted an interview with the Applicant's representative, Takashi Saito, on February 23, 2009.

Rejection under 35 U.S.C. § 102

Claims 1-3, 10-13 and 16-19 were rejected under 35 U.S.C. § 102(b) as being anticipated by Asao et al. (US 6,377,030). Applicants respectfully traverse this rejection.

Applicants respectfully submit that amended claim 1 has been amended to incorporate all of the limitations of claim 2 and additional subject matter. Applicants submit that Asao fails to disclose the operation of the power system as recited by amended claim 1.

In rejecting original claim 1, the Examiner asserts that Asao discloses the charge/discharge controller controls the charge/discharge such that the voltage of the electrochemical device approaches the threshold value. Further, in rejecting original claim 2, the Examiner asserts that the charge/discharge controller causes the electrochemical device to be charged when the voltage is lower than the threshold value and causes the electrochemical device to be discharged when the voltage is higher than the threshold value. Specifically, the Examiner asserts that the controller 208 of Asao corresponds to the claimed charge/discharge controller

and operates the claimed control. In this regard, the Examiner pointed out, during the interview, that FIGS. 10 and 12 disclose the operation of the charge/discharge controller of the claims.

First, Applicants respectfully submit that Asao discloses a method and an apparatus for charging the secondary battery up to the full charge status beyond the inflection points (see, col. 8, line 59 to col. 9, line 5 of Asao). The final point by controlling the charge/discharge of Asao is the full charge status (100%). In other words, the method of Asao controls charge/discharge of the battery such that the battery is fully charged, but does not control the charge/discharge of the electrochemical device such that the voltage of the electrochemical device approaches the threshold value below the full charge status (see, paragraph [0056] of the present application). It is noted that at the full charge status, there is no inflection points because in Asao, the direction of the curvature does not change at the full charge status (see, FIGS. 1, 10 and 11 of Asao). In contrast, in the present application, the inflection point exists greater than 0 % and less than 100% of a remaining capacity.

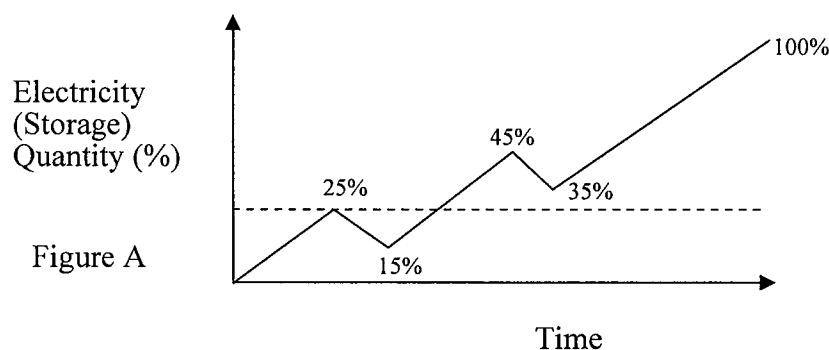
Next, Applicants respectfully submit that the controller 208 of Asao does not control the charge/discharge of the electrochemical device based on the output of the comparator. In Asao, the charge/discharge is controlled according to the predetermined charge/discharge pattern as shown in FIG. 12 of Asao. Asao states at col. 18, lines 14-22:

The secondary battery using the tin anode produced according to the above method was charged by the current equivalent to 0.1 C (hour rate 10), to the storage quantity 25%, then the electricity quantity of 10% was discharged by the current equivalent to 0.1 C, thereafter the charge was carried out to the electricity quantity 30% (storage quantity 45%), the discharge of electricity quantity 15% was then carried out, and thereafter the battery was charged to full charge.

It is clear that Asao does not use the output of the comparator to control the charge/discharge. It appears that Asao may monitor the voltage (or current) of the battery (see, col. 10, line 62 – col. 11, line 6 of Asao), the controller uses the outputs to know whether the

voltage reaches the predetermined value. For example, in FIG. 12, the controller of Asao charges the battery until the electricity quantity reaches 25%, which corresponds to the first inflection point (see, FIG. 10). The monitoring device (for example, charge current detection circuit 203, discharge current detection circuit 205 or call voltage detection circuit 204) in Asao monitors whether the electricity quantity (charge) reached 25%. When the quantity reaches 25%, the controller discharges according to the predetermined charge/discharge cycle until the electricity quantity reaches 15% (25-10%). Then, when the quantity reaches 15%, the controller charges the battery, according to the predetermined charge/discharge cycle, until the quantity reaches 45% (15+30%), which corresponds to the second inflection point. The controller discharges the battery because the electricity quantity reaches the predetermined value (i.e., 25%) and charges the battery because the quantity reaches the predetermined value (i.e., 15%). The controller of Asao neither charges the battery because the measured voltage is lower than the threshold voltage nor discharges the battery because the measured voltage is higher than the threshold voltage.

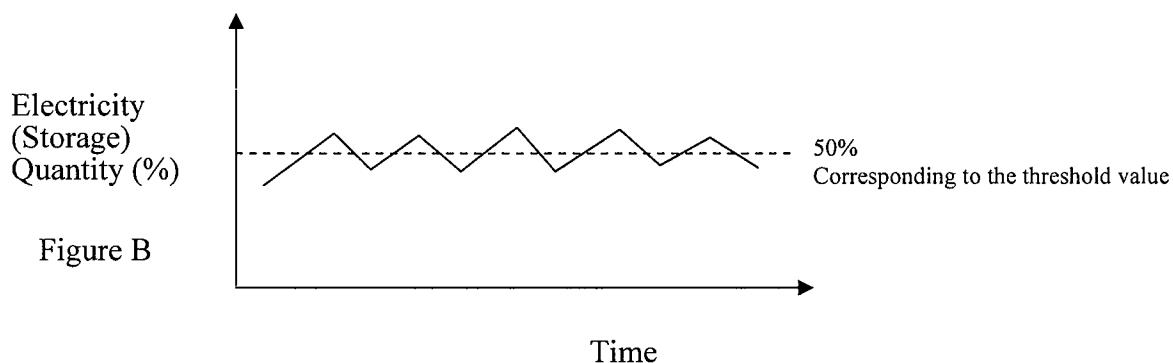
The following figure A illustrates the operation of Asao according to FIGS. 10 and 12.



From Figure A, it is clear that, even though the quantity reached the amount corresponding to the first (or second) inflection point (25%), the charge/discharge is not controlled **so that the voltage of the electrochemical device approaches said threshold value**. Specifically, even

when the quantity exceeds 25% (the first inflection point), the controller of Asao does not discharge so that the quantity approaches the first inflection point, 25%. In other embodiments of Asao (i.e., embodiments 2-7), the controller operates in substantially similar manner. It should be noted that the embodiments 5-7 uses the MCBN anode which has FIG. 11 property (see, col. 17, lines 63-67 and col. 18, lines 61-67 of Asao).

The following figure B illustrates the operation of the claimed controller.



From Figure B, it is clear that the quantity approaches (i.e., converges with) the amount (e.g., 50%) corresponding to the threshold value. It is noted that the charge/discharge does not necessarily end at the threshold value (inflection point).

As such, it is clear that the controller of Asao does not control the charge/discharge, **based on an output of the comparator**, causing the electrochemical device to be charged when the voltage is lower than the threshold value and the electrochemical device to be discharged when the voltage is higher than the threshold value so that the voltage of the electrochemical device approaches said threshold value, as recited by amended claim 1.

Accordingly, since Asao fails to disclose the above discussed limitations of claim 1, claim 1 and any claim dependent thereon are patentable over Asao. Since claim 16 has amended to recite substantially similar limitations as claim 1, this claim and any claim dependent thereon are also patentable over Asao.

Regarding amended claim 2, Applicants respectfully submit that Asao fails to disclose the limitations of claim 2. As discussed above, Asao controls the charge/discharge of the battery according to the predetermined charge/discharge cycle. Further, when the electricity quantity reaches the amount corresponding to the inflection points (e.g., 25%) by being charged, i.e., the voltage equals to the threshold value, the controller then “discharges” the battery. In contrast, in claim 2, when the voltage equals to the threshold value, the charge/discharge controller charges if the electrochemical device is being charged upon the output of the comparison result, and discharges if the electrochemical device is being discharged upon the output of the comparison result. As such, since Asao fails to disclose the above limitations of claim 2, it is clear that claim 1 is patentable over Asao for its own merit in addition to the dependency upon claim 1.

Rejection under 35 U.S.C. § 103(a)

Claims 6-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao in view of Yamaguchi et al. (US 2002/0062183). Claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao in view of Inatomi et al. (US 2004/0045818). Claims 14-15 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao in view of Kimura et al. (US 2002/0195999). Applicants respectfully traverse these rejections for at least the following reasons.

Applicant incorporates herein the arguments previously advanced in traversal of the rejection under 35 U.S.C. § 102(b) predicated upon Asao. Dependent claims 6-9, 14-15 and 20 are free from the applied art in view of their dependency from independent claim 1. Specifically, none of Yamaguchi, Inatomi and Kimura cures the deficiencies of Asao.

Further, Applicants respectfully submit that the present application was made based on the Applicants' findings that, when the charge/discharge curve of the electrochemical device has at least one step, the voltage of the electrochemical device changes significantly near the step, and it is thus easy to determine whether the voltage is larger or smaller than a threshold value that is set at the inflection point of the step or its adjacent point (see, paragraph [0036] of the present application. None of the cited references recognize or even suggest these findings. Thus, it would not have been obvious to combine Asao with any of Yamaguchi, Inatomi and Kimura to arrive at the claimed subject matter of the present application.

Thus, Applicant respectfully requests that the Examiner withdraw the rejection of claims 6-9, 14-15 and 20 under 35 U.S.C. § 103(a).

New Claims

Since new claims 21 and 22 depend upon claim 1 and claim 16, respectively, these claims are patentable over the cited references. Also, none of the cited references disclose or suggest the limitations of claims 21 and 22, these claims are patentable for their own merit in addition to the dependency upon claims 1 or 16.

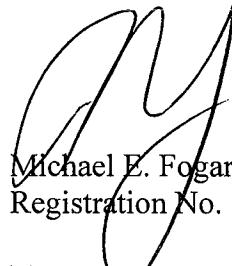
CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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